

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)	
Per-Olof BRANDT)	
Application No.: UNASSIGNED)	Group Art Unit: UNASSIGNED
)	Examiner: UNASSIGNED
Filed: November 28, 2001)	
For: A RADIO FREQUENCY)	
AMPLIFYING CIRCUIT)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please replace claims 1, 4-8, 11, 15 and 17 as follows.

1. (Amended) A hybrid coupler having four ports and capable of coupling radio frequency signals having a certain frequency from at least one port to at least one other port, characterized in that the hybrid coupler is implemented as a differential coupler arranged to couple differential radio frequency signals.

4. (Amended) A hybrid coupler according to claim 1, characterized in that the hybrid coupler is a 3 dB coupler, such that power of said frequency supplied to one port is split substantially equally between two other ports, while the remaining port is substantially isolated from the other ports.

5. (Amended) A hybrid coupler according to claim 4, characterized in that the hybrid coupler is arranged to split the power between the two other ports in such a way that the signals provided at these ports are in phase with each other.

6. (Amended) A hybrid coupler according to claim 4, characterized in that the hybrid coupler is arranged to split the power between the two other ports in such a way that the signals provided at these ports are in quadrature to each other.

7. (Amended) A hybrid coupler according to claim 6, characterized in that the hybrid coupler is a line-coupled hybrid.

8. (Amended) An amplifying circuit for radio frequency signals having a certain frequency and thus a certain wavelength, said circuit comprising at least:

a first hybrid coupler having

an input port to which radio frequency signals can be applied;

an isolated port;

a first output port; and

a second output port;

and being arranged for dividing a signal applied to the input port into a first signal component to the first output port and a second signal component to the second output port;

a first amplifier having an input port and an output port, said input port being connected to the first output port of the first hybrid coupler;

a second amplifier having an input port and an output port, said input port being connected to the second output port of the first hybrid coupler; and

a second hybrid coupler having

a first input port connected to the output port of the first amplifier;

a second input port connected to the output port of the second amplifier;
an isolated port; and
an output port connectable to an output load impedance;
and being arranged for combining signals applied to the first input port and the second input port to the output port;

said first and second hybrid couplers and said first and second amplifiers providing a first and a second path for radio frequency signals from the input port of the first hybrid coupler to the output port of the second hybrid coupler, said first path comprising the first amplifier and said second path comprising the second amplifier, and wherein the total electrical lengths of the two paths are substantially identical, and the electrical length from the input port of the first hybrid coupler to each of the input ports of the first and second amplifiers differs by a quarter of a wavelength for said radio frequency signals,

characterized in that said hybrid couplers are implemented as differential couplers arranged to couple differential radio frequency signals, and said amplifiers are differential amplifiers.

11. (Amended) An amplifying circuit according to claim 8, characterized in that said first and second hybrid couplers are 3 dB couplers.

15. (Amended) A portable radio communications device comprising an amplifying circuit according to claim 8.

17. (Amended) A method of amplifying radio frequency signals having a certain frequency and thus a certain wavelength, said method comprising the steps of:

applying radio frequency signals to an input port of a first hybrid coupler;
dividing the signals applied to the input port into a first signal component to a first output port of the first hybrid coupler and a second signal component to a second output port of the first hybrid coupler;

amplifying said first signal component in a first amplifier having an input port and an output port, said input port being connected to the first output port of the first hybrid coupler;
amplifying said second signal component in a second amplifier having an input port and an output port, said input port being connected to the second output port of the first hybrid coupler;
coupling the amplified first signal component from the output port of the first amplifier to a first input port of a second hybrid coupler and the amplified second signal component from the output port of the second amplifier to a first input port of the second hybrid coupler;
combining in the second hybrid coupler the signals applied to the input ports thereof to an output signal on the output port of the second hybrid coupler;
and
coupling said output signal to an output load impedance,

wherein the total electrical lengths of the paths of the two signal components from the input port of the first hybrid coupler to the output port of the second hybrid coupler are substantially identical, and the electrical length from the input port of the first hybrid coupler to each of the input ports of the first and second amplifiers differs by a quarter of a wavelength for said radio frequency signals, characterized in that the radio frequency signals are applied, coupled and amplified as differential signals from the input port of the first hybrid coupler to the output port of the second hybrid coupler.

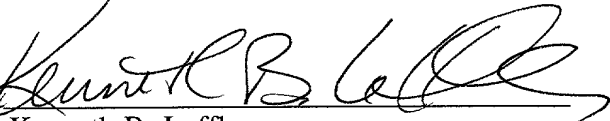
REMARKS

The claims of the originally-filed application were drafted in accordance with a foreign patent practice. The claims are hereby amended merely to present an initial set of claims for examination that conform to U.S. patent practice.

Respectfully submitted,

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Attachment to Amendment dated November 28, 2001

Marked-up Claims 1, 4-8, 11, 15 and 17

1. (Amended) A hybrid coupler [(66, 67; 72, 73)] having four ports and capable of coupling radio frequency signals having a certain frequency from at least one port to at least one other port, characterized in that the hybrid coupler [(66, 67; 72, 73)] is implemented as a differential coupler arranged to couple differential radio frequency signals.

4. (Amended) A hybrid coupler according to claim 1 [any one of claims 1-3], characterized in that the hybrid coupler [it] is a 3 dB coupler, such that power of said frequency supplied to one port is split substantially equally between two other ports, while the remaining port is substantially isolated from the other ports.

5. (Amended) A hybrid coupler according to claim 4, characterized in that the hybrid coupler [it] is arranged to split the power between the two other ports in such a way that the signals provided at these ports are in phase with each other.

6. (Amended) A hybrid coupler according to claim 4, characterized in that the hybrid coupler [it] is arranged to split the power between the two other ports in such a way that the signals provided at these ports are in quadrature to each other.

7. (Amended) A hybrid coupler according to claim 6, characterized in that the hybrid coupler [it] is a line-coupled hybrid.

8. (Amended) An amplifying circuit for radio frequency signals having a certain frequency and thus a certain wavelength, said circuit comprising at least:

- [•] a first hybrid coupler [(66; 72)] having
 - [•] an input port to which radio frequency signals can be applied[,];
 - [•] an isolated port[,];

[•] a first output port[,]; and

[•] a second output port[,];

and being arranged for dividing a signal applied to the input port into a first signal component to the first output port and a second signal component to the second output port[,];

[•] a first amplifier [(62, 63)] having an input port and an output port, said input port being connected to the first output port of the first hybrid coupler [(66; 72),];

[•] a second amplifier [(64, 65)] having an input port and an output port, said input port being connected to the second output port of the first: hybrid coupler [(66; 72),]; and

[•] a second hybrid coupler [(67; 73)] having

[•] a first input port connected to the output port of the first amplifier [(62, 63),];

[•] a second input port connected to the output port of the second amplifier [(64, 65),];

[•] an isolated port[,]; and

[•] an output port connectable to an output load impedance[,];

and being arranged for combining signals applied to the first input port and the second input port to the output port[,];

said first and second hybrid couplers and said first and second amplifiers providing a first and a second path for radio frequency signals from the input port of the first hybrid coupler [(66; 72)] to the output port of the second hybrid coupler [(67; 73)], said first path comprising the first amplifier [(62, 63)] and said second path comprising the second amplifier [(64, 65)], and wherein the total electrical lengths of the two paths are substantially identical, and the electrical length from the input port of the first hybrid coupler to each of the input ports of the first and second amplifiers differs by a quarter of a wavelength for said radio frequency signals,

characterized in that said hybrid couplers [(66, 67; 72, 73)] are implemented as differential couplers arranged to couple differential radio frequency signals, and said amplifiers [(62, 63; 64, 65)] are differential amplifiers.

11. (Amended) An amplifying circuit according to claim 8 [any one of claims 8-10], characterized in that said first and second hybrid couplers are 3 dB couplers.

15. (Amended) A portable radio communications device comprising an amplifying circuit according to [any one of claims 8-14] claim 8.

17. (Amended) A method of amplifying radio frequency signals having a certain frequency and thus a certain wavelength, said method comprising the steps of:

- [•] applying radio frequency signals to an input port of a first hybrid coupler [(66; 72),];
- [•] dividing the signals applied to the input port into a first signal component to a first output port of the first hybrid coupler and a second signal component to a second output port of the first hybrid coupler[.];
- [•] amplifying said first signal component in a first amplifier [(62, 63)] having an input port and an output port, said input port being connected to the first output port of the first hybrid coupler [(66; 72),];
- [•] amplifying said second signal component in a second amplifier [(64, 65)] having an input port and an output port, said input port being connected to the second output port of the first hybrid coupler [(66; 72),];
- [•] coupling the amplified first signal component from the output port of the first amplifier [(62, 63)] to a first input port of a second hybrid coupler [(67; 73)] and the amplified second signal component from the output port of the second amplifier [(64, 65)] to a first input port of the second hybrid coupler [(67; 73),];

- [•] combining in the second hybrid coupler [(67; 73)] the signals applied to the input ports thereof to an output signal on the output port of the second hybrid coupler[.]; and

- [•] coupling said output signal to an output load impedance,

wherein the total electrical lengths of the paths of the two signal components from the input port of the first hybrid coupler to the output port of the second hybrid coupler are substantially identical, and the electrical length from the input port of the first hybrid coupler to each of the input ports of the first and second amplifiers differs by a quarter of a wavelength for said radio frequency signals, characterized in that the radio frequency signals are applied, coupled and amplified as differential signals from the input port of the first hybrid coupler [(66, 72)] to the output port of the second hybrid coupler [(67; 73)].